

What is claimed is:

1. A method of determining a time offset estimate between a central node and a secondary node, comprising:

receiving, at a central node, downlink and uplink timing information from a secondary node, the downlink and uplink timing information based on a periodic timing scale, the downlink timing information representing timing information for communication from the central node to the secondary node and the uplink information representing timing information for communication from the secondary node to the central node;

converting the received downlink and uplink timing information to a continuous time scale; and

determining a time offset estimate between the central node and the secondary node based on the converted downlink and uplink timing information.

2. The method of claim 1, wherein the downlink information includes a first time measured at the central node of sending a downlink frame to the secondary node and a second time measured at the secondary node of receiving the downlink frame, and the uplink information includes a third time measured at the secondary node of sending an uplink frame.

3. The method of claim 2, further comprising:

measuring, at the central node, a fourth time of receiving the uplink frame; and wherein

the converting step converts the first, second, third and fourth times to a continuous time scale.

4. The method of claim 3, wherein the determining step comprises:

determining uplink and downlink delay indicators based on the converted first, second, third and fourth times; and

calculating the time offset estimate based on the uplink and downlink delay indicators.

5. The method of claim 4, wherein

the determining uplink and downlink delay indicators step is performed for a plurality of first, second, third and fourth time sets; and

the calculating step calculates the time offset estimate based on the plurality of uplink and downlink delay indicators.

6. The method of claim 5, wherein the calculating step comprises:

determining a minimum uplink delay indicator and a minimum downlink delay indicator from the plurality of uplink and downlink delay indicators; and

calculating the time offset estimate based on the minimum downlink delay indicator and the minimum uplink delay indicator.

7. The method of claim 1, further comprising:

sending a downlink frame to the secondary node, the downlink frame including a first time measured at the central node indicating when the downlink frame is sent; and wherein

the receiving step receives an uplink frame at the central node, the uplink frame includes the first time, a second time measured at the secondary node of receiving the downlink frame, a third time measured at the secondary node of sending the uplink frame.

8. The method of claim 1, further comprising:

setting a timer at a start of the method; and  
stopping the method if the timer times out.

9. The method of claim 1, further comprising:

compensating the time offset estimate for DC bias errors.

10. The method of claim 1, wherein the central node is a radio network controller.

11. A method of determining a time offset estimate between a central node and a secondary node, comprising:

receiving, at a central node, downlink and uplink timing information from a secondary node, the downlink and uplink timing information based on a periodic timing scale, the downlink timing information representing timing information for communication from the central node to the secondary node and the uplink information representing timing information for communication from the secondary node to the central node;

adjusting the received downlink and uplink timing information for time wraparound; and

determining a time offset estimate between the central node and the secondary node based on the adjusted downlink and uplink timing information.